

# INTERNATIONAL STANDARD

---

**Eyewear display –  
Part 10: Specifications**





**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2023 IEC, Geneva, Switzerland**

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

**About the IEC**

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

**About IEC publications**

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

**IEC publications search - [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)**

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

**IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)**

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

**IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)**

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [sales@iec.ch](mailto:sales@iec.ch).

**IEC Products & Services Portal - [products.iec.ch](http://products.iec.ch)**

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

**Electropedia - [www.electropedia.org](http://www.electropedia.org)**

The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.



IEC 63145-10

Edition 1.0 2023-09

# INTERNATIONAL STANDARD

---

**Eyewear display –  
Part 10: Specifications**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 31.120

ISBN 978-2-8322-7465-1

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references .....	6
3 Terms, definitions, and abbreviated terms .....	6
3.1 Terms and definitions.....	6
3.2 Abbreviated terms.....	7
4 Specification tables .....	7
4.1 Generic specification tables .....	7
4.2 Basic specification tables.....	9
5 Common conditions for basic specifications.....	11
5.1 General.....	11
5.2 Spectral directional transmittance .....	11
5.2.1 Measurement methods .....	11
5.2.2 Measurement conditions.....	11
5.2.3 Calculation conditions.....	11
5.3 Maximum centre luminance (full-screen white).....	11
5.3.1 Measurement methods .....	11
5.3.2 Measurement conditions.....	11
5.4 Minimum centre luminance (full-screen white).....	11
5.4.1 Measurement methods .....	11
5.4.2 Measurement conditions.....	12
5.5 Luminance uniformity (full-screen white).....	12
5.5.1 Measurement methods .....	12
5.5.2 Measurement conditions.....	12
5.5.3 Calculation conditions.....	12
5.6 Centre contrast ratio .....	12
5.6.1 Measurement methods .....	12
5.6.2 Measurement conditions.....	12
5.6.3 Calculation conditions.....	13
5.7 Diagonal FOV .....	13
5.7.1 Measurement methods .....	13
5.7.2 Measurement conditions.....	13
5.8 Number of electrically addressable pixels .....	13
5.9 Eye-box width and height.....	13
5.9.1 Measurement method .....	13
5.9.2 Measurement conditions.....	13
6 Specifications for AR displays .....	13
6.1 General.....	13
6.2 Specification tables of transmittance and luminance (AR-type) .....	14
6.3 Classification and applicable cases.....	14
6.3.1 Spectral directional transmittance.....	14
6.3.2 Luminance ratio of virtual image versus background.....	17
7 Specifications for video see-through eyewear displays .....	21
7.1 General.....	21
7.2 Specification table to see the image.....	21
7.3 Video see-through eyewear display – Luminance ratio.....	21

Annex A (informative) Example of illuminance of a scene ..... 23

    A.1    Illuminance of indoor scene ..... 23

    A.2    Illuminance of outdoor scene ..... 23

Annex B (informative) Back side stray light ..... 24

Bibliography..... 25

  

Figure 1 – Examples of ambient illuminations ..... 18

Figure 2 – Image in video see-through eyewear display ..... 21

  

Table 1 – Blank detail specification table of optical characteristics (applicable to AR and VR) ..... 7

Table 2 – Blank detail specification table of optical characteristics (applicable to AR)..... 9

Table 3 – Blank basic specification table (AR-type)..... 10

Table 4 – Blank basic specification table (VR-type)..... 10

Table 5 – Specification table of transmittance and luminance (AR-type)..... 14

Table 6 – Classifications of transmittance ..... 15

Table 7 – Level of transmittance for applicable use cases and illuminance ..... 15

Table 8 – Range of luminance ratio..... 19

Table 9 – Direction to automatic and manual luminance adjustments ..... 20

Table 10 – Specification table of luminance (for eyewear displays excluding optically see-through displays) ..... 21

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**EYEWEAR DISPLAY –****Part 10: Specifications****FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 63145-10 has been prepared by IEC technical committee 110: Electronic displays. It is an International Standard.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
110/1539/FDIS	110/1560/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

A list of all parts in the IEC 63145 series, published under the general title *Eyewear display*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

## EYEWEAR DISPLAY –

### Part 10: Specifications

#### 1 Scope

This part of IEC 63145 establishes specifications and requirements for eyewear displays. This document is applicable to virtual reality (VR)-type (non-see-through) and augmented reality (AR)-type (see-through) eyewear displays using virtual image optics. The specifications and requirements for prescription lenses are out of the scope of this document.

#### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 63145-1-2, *Eyewear display – Part 1-2: Generic – Terminology*

IEC 63145-20-10:2019, *Eyewear display – Part 20-10: Fundamental measurement methods – Optical properties*

IEC 63145-20-20:2019, *Eyewear display – Part 20-20: Fundamental measurement methods – Image quality*

IEC 63145-22-10:2020, *Eyewear display – Part 22-10: Specific measurement methods for AR type – Optical properties*

IEC 63145-22-20<sup>1</sup>, *Eyewear display – Part 22-20: Specific measurement methods for AR type – Image quality*

#### 3 Terms, definitions, and abbreviated terms

##### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 63145-1-2 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

---

<sup>1</sup> Under preparation. Stage at the time of publication: IEC AFDIS 63145-22-20:2023.